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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/746,064	12/26/2000	Mizuhisa Nihei	001701	1990

7590

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EXAMINER

BAUMEISTER, BRADLEY W

ART UNIT PAPER NUMBER

2815

DATE MAILED: 01/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/746,064

Applicant(s)
Nihei et al.

Examiner
B. William Baumeister

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Nov 5, 2002
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-8 and 10-13 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-8 and 10-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other:

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DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 U.S.C. § 103

2. Claims 3, 4 and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants Admitted Prior Art in view of Imaizumi et al. '717.

- a. Applicant acknowledges that it was known to make metal gate MESFETs and HEMTs with S/D and G contacts that are composed of Ti/Pt/Au (see e.g., prior art FIG 1 and the BACKGROUND OF THE INVENTION portion of the specification). Applicant does not disclose that it was known to further provide metal oxides interposed between the metal gate and the channel.

- b. Imaizumi discloses MESFETs having Schottky gate electrodes formed over III-V semiconductor layers with a thin metal oxide interposed therebetween. The oxides may be formed of various metals such as Ti, Co or Ni. Further, while Imaizumi provides express examples of InP based semiconductors, the teachings are not so limited. Rather, the reference expressly states that the invention may be employed in other III-V semiconductor systems (col. 6, lines 1-3). It would have been obvious to one of ordinary skill in the art at the time of the invention to have employed a metal oxide as taught by Imaizumi at the metal gate/semiconductor interface of the prior-art

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MESFET or HEMT for the purpose of reducing the leakage current and increasing the breakdown voltage as taught by Imaizumi (e.g., ABSTRACT).

c. Regarding claims 3 and 4, regardless of whether Imaizumi expressly recites whether the oxide is stoichiometric or not, it was well known to those of ordinary skill in the art at the time of the invention that whether the oxide's composition is stoichiometric depends on the oxidation times and conditions, and no unexpected results would result from using one vs the other.

3. Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art--Imaizumi et al. '717 as applied to the claims above and further in view of Kirchner et al. '450 (previously made of record). Imaizumi teaches that the oxide may be interposed between the gate and the semiconductor, but does not further teach that it may be employed over other regions of the surface.

a. Kirchner discloses FETs having a tunneling oxide insulating layer interposed between the gate and channel. Further, various embodiments depict that the oxide may be formed under the S/D regions (FIG 9) and may cover the entire surface (FIG 10). It would have been obvious to one of ordinary skill in the art at the time of the invention to have further employed the tunnel metal oxide as taught by Applicant's Admitted Prior Art--Imaizumi under the S/D regions as taught by Kirchner for the purpose of preventing metal from diffusing therefrom into the

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semiconductor. It would have been further obvious to coat the entire surface for the purpose of simplifying the masking design.

Response to Arguments

4. Applicant's arguments filed 11/5/2002 have been fully considered but are either moot or they are not persuasive.

a. Applicant has argued that FIG 1 is labeled as "Related Art" as opposed to "Prior Art," so that reliance on FIG 1 as Prior Art in order to establish these rejections is not proper (REMARKS, page 5). However, regardless of which label is employed, applicant has, in fact, acknowledged that the structure of FIG 1 was conventional (see the BACKGROUND section of the specification at page 3, line 15-, wherein Applicant states, "[i]n such a conventional compound-semiconductor triodes [of FIG 1]..."). As such, the conclusory assertions of Applicant's representative cannot substitute for evidence that the structure of FIG 1 was not--in fact--prior art.

b. In response to applicant's argument that Imaizumi addresses the issues of increasing the gate breakdown voltage and minimizing reverse leakage current by increasing the Schottky barrier height of the gate electrode, but that there is no suggestion at all to suppress the threshold voltage change caused by diffusion of Ti atoms (REMARKS page 5), the fact that applicant has recognized another advantage which would flow naturally from following the

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suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

INFORMATION ON HOW TO CONTACT THE USPTO

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, **B. William Baumeister**, at (703) 306-9165. The examiner can normally be reached Monday through Friday, 8:30 a.m. to 5:00 p.m. If the Examiner is not available, the Examiner's supervisor, Mr. Eddie Lee, can be reached at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.



B. William Baumeister

Patent Examiner, Art Unit 2815

January 11, 2003